

Dual-Core Intel® Xeon® Processor

DELIVERING EIGHT-THREAD CAPABILITY TO DUAL PROCESSOR SERVERS

Introducing Intel's first dual-core processor for DP platforms.

With Intel built in, your company has confidence built in. Intel's first dual-core server processor unleashes a new era of server performance and flexibility, providing businesses with platforms that can better handle complex, simultaneous transactions and escalating workloads.

Dual-Core Intel® Xeon® processor-based server platforms are the ideal solution for multithreaded and multi-task usage environments. Based on the widely deployed Intel® E7520 chipset, these processors can provide performance gains of up to 50%¹ compared to previous single-core platforms tested and are backwards-compatible with all 64-bit Intel® Xeon® processors.

Multi-Core architecture: Intel's roadmap for the future.

Intel recognizes that the need for platforms with the right type of compute power and performance will continue to escalate over time. The evolution is likely to include better recognition applications and search functions that enable seamless mining of information, and support knowledgeable, data-based decision making.

As these and other emerging consumer- and business-usage models become mainstream, they will require increasingly more compute power. A comprehensive threading strategy that advances the platform—through Hyper-Threading Technology² (HT Technology), dual-core processors, and eventually multi-core processors—is crucial to delivering this compute power.

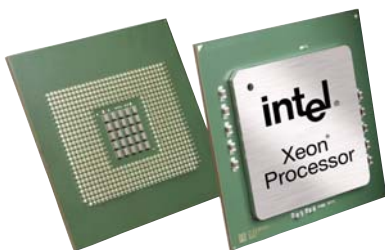
Intel has been driving toward parallelism for more than a decade: first with multiprocessor platforms, then with HT Technology, and now with dual-core processing. Going forward, Intel plans to continue to focus its efforts on technologies that help make the balanced platform a reality.





Make the transition to 64-bit computing now.

With 64-bit Intel Xeon processor-based server platforms, you know you're getting a proven platform with the flexibility to take you into the future.



There are compelling reasons to move your business to 64-bit computing now. 64-bit computing with Intel Xeon processors helps give you additional application headroom, I/O headroom, improved reliability, lower power consumption, memory flexibility, and increased security compared to prior-generation platforms.

By supporting larger data sets and both 32- and 64-bit applications, 64-bit Intel Xeon processor-based servers allow the smooth migration of your business solutions to 64-bit applications. And with over six million 64-bit processors already shipped, you know you can depend on Intel's proven track record to help you make a smooth transition to the next generation of computing.

For more information on performance, please visit
www.intel.com/performance/server/xeon

The performance, reliability, and flexibility customers demand.

Dual-Core Intel Xeon processors deliver enhanced platform performance and dependability through a variety of innovative technologies that include the following:

- New dual-core processors help improve processor throughput by increasing CPU resources.
- Increased performance, with dual-core processors that can provide up to 50%¹ increase compared to prior-generation, single-core platforms tested.
- Get faster response times with double the L2 cache as compared to the previous generation of Intel Xeon processors.
- Intel® Extended Memory 64 Technology³ (Intel® EM64T) provides application flexibility with support for 64-bit computing.
- HT Technology helps support the execution of more than one instruction set at a time, resulting in a new level of system performance and responsiveness when multi-tasking.
- Enhanced HALT state (C1E) helps reduce the processor speed and voltage when in idle mode to decrease power consumption and heat generation.
- Take advantage of power savings and increased system density for server applications by using Demand-Based Switching⁴ (DBS) with Enhanced Intel SpeedStep® technology. New functionality has been added to the Dual-Core Intel Xeon processor 2.80 GHz to enable support for DBS.
- Scalable bandwidth with PCI Express⁵, an I/O technology that matches the performance and capabilities of next-generation serial interconnects.
- DDR2-400 memory-based subsystem can offer lower latency while consuming less power.
- Help prevent certain classes of known malicious “buffer overflow” and worm attacks with Intel’s Execute Disable Bit functionality.



Target applications

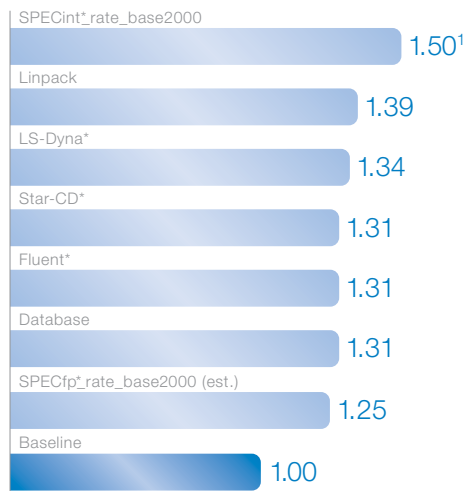
Servers based on 64-bit Intel Xeon processors are the most widely deployed in the world (Source: IDC Tracker, August 2005), because they can do virtually anything business demands of them, worry-free. And Dual-Core Intel Xeon processors take that performance even further, offering compelling value for database, Web, and mail applications.

Server Type	Application Category	Application Software Examples
Front-end servers, Internet infrastructure	Cache/Web	Microsoft ISS*, Apache Server*
	Directory	Microsoft Active Directory*
	Security infrastructure	RSA BSAFE*/SSL-C*, Symantec Norton AV*/Enterprise Firewall*, Microsoft Crypto Library*, Network Associates, McAfee, Verisign PKI*
	Mail and messaging	Lotus Notes*, Microsoft Exchange*
Application servers	e-Commerce, e-Business, Customer Relationship Management (CRM)	Adobe Altercast*, Ariba Buyer*, CA CleyerPath*, Interwoven TeamSite*, Microsoft Commerce Server*, Pivotal, Reuters Plus*, Siebel, SAP, SunGard Adaptiv*
	Collaboration	PTC Windchill*, UGS Teamcenter*, Microsoft Exchange Server*
	Managed Run-Time Environments (MRTE)	BEA WebLogic*, IBM WebSphere*, JBoss, Microsoft .NET*
Enterprise management	System management, storage management	BMC Performance Manager*, Symantec Storage Foundation
Databases	Database (small-business and departmental data)	IBM DB2*, Microsoft SQL Server*, MySQL, Oracle 10g*, Sybase ASE*
High-performance computing	Clustering, rendering	OSCAR*, SCYLD*, SCore*, Pixar Renderman*

Can provide up to an additional 50%¹ performance improvement with Dual-Core Intel® Xeon® Processor 2.80 GHz

Dual-Core Intel® Xeon® Processor 2.80 GHz

Dual-core platform versus prior-generation single-core platform



DATA SOURCE: Published results/Intel internal measurement, Q4 2005

Relative performance—higher is better.

- Both platforms utilize Intel® E7520 chipset and 800 MHz system bus
- Dual-core processor: Dual-Core Intel® Xeon® processor 2.80 GHz
- Single-core processor: Intel® Xeon® processor 3.60 GHz with 2MB L2 cache

Dual-core processing can provide up to 50%¹ performance gain.

SPECint*_rate_base2000. Performance gain based on result submitted to www.spec.org on SPECint*_rate_base2000 benchmark. **Baseline System Configuration:** IBM eServer® xSeries® 346 Server platform with two 64-bit Intel® Xeon® processors 3.60 GHz with 2MB L2 Cache and 800 MHz system bus 8x512MB ECC PC2-3200 DIMMs for RAM and Windows® 2003 Standard Edition for OS. Intel Compiler 8.1 binaries. For more information see <http://www.spec.org/cpu2000/results/res2005q2/cpu2000-20050514-04113.html>. **New Platform Configuration:** IBM eServer® xSeries® 346 Server platform with two Dual-Core Intel® Xeon® processors 2.80 GHz with 2x2MB L2 Cache 800 MHz system bus, 4 GB DDR2, Microsoft Windows Server® 2003, standard Edition, Intel C/C++ Compiler 9.0 (20050624Z) for 32-bit applications, Intel Fortran Compiler 9.0 (20050624Z) for 32-bit applications, Microsoft Visual Studio .NET® 13.0.9466 (for libraries) MicroQuill Smartheap Library® 7.30 Submitted to www.spec.org for review as of Oct 10, 2005. For additional information on other applications tested and benchmark results see <http://www.intel.com/performance/server/xeon/index.htm>. Results vary by hardware and software configuration.

SPECfp*_rate_base2000. Baseline System Configuration: Dell PowerEdge® 1425SC: Two 64-bit Intel® Xeon® processors 3.60 GHz with 2MB L2 Cache, 4x512MB (dual-ranked) DDR-2 DIMMs for RAM and Red Hat Enterprise Linux® Update 2, Intel® EM64T, Binaries with Intel 8.1 EM64T Linux compilers Referenced as published at <http://www.spec.org/cpu2000/results/res2005q1/cpu2000-20050207-03822.html>. New Platform configuration: Intel internal measurement (September 2005). Intel® Server System "Coyote 2" with two Dual-Core Intel® Xeon® processors 2.80 GHz, Intel® E7520 Chipset, 800 MHz FSB; 8 GB DDR2-400 memory (8x1GB), Hyper-Threading Technology OFF; HWP and ASP enabled. OS: Red Hat Enterprise Linux EM64T. SPECcpu2000 binaries built with Intel compiler version 8.1

Database. This Intel internal workload evaluates the capacity of a database server in supporting transaction processing. Simulates execution of user transactions against a database in an order-entry environment. Measured in transactions per second. Intel internal measurement (September 2005). Baseline platform Configuration: Intel® Server System "Coyote" with two 64-bit Intel® Xeon® processors 3.60 GHz with 2MB L2 Cache, Intel® E7520 Chipset, 800 MHz FSB; 16 GB DDR2-400 memory (8x2GB); Hyper Threading ON; HWP and ASP enabled; Microsoft Windows® Enterprise Server 2003, x86 Edition. New Platform configuration Intel® Server System "Coyote 2" with two Dual-Core Intel® Xeon® processors 2.80 GHz, Intel® E7520 Chipset, 800 MHz FSB; 16 GB DDR2-400 memory (8x2GB); Hyper-Threading Technology ON; HWP and ASP disabled. Microsoft Windows® Enterprise Server 2003, x86 Edition.

LS-Dyna* mpp970.5434a (3cars wkld@10ms, jobs/day), Star-CD* v3.22 (64-bit) (Engine wkld, jobs/day), Fluent* 6.2(64-bit). Common system configuration for the above HPC applications. Intel internal measurement (September 2005). Baseline Platform Configuration: Intel® Server System "Coyote" with two 64-bit Intel® Xeon® processors 3.60 GHz with 2 MB L2 Cache, Intel® E7520 Chipset, 800 MHz FSB; 8 GB DDR2-400 memory (8x1GB); OS: Red Hat Enterprise Linux AS release 3 (Taroon Update 2) Linux version 2.4.21-12.EL, EM64T Intel LINPACK Workload Version: 2.1 for EM64T, Workload: 1Kx1K through 30Kx30K matrix sizes used; Workload Type: Scalar. New Platform configuration: Intel® Server System "Coyote 2" with two Dual-Core Intel® Xeon® processors 2.80 GHz, Intel® E7520 Chipset, 800 MHz FSB; 8 GB DDR2-400 memory (8x1GB), OS: Red Hat Enterprise Linux® AS release 4 (Nahant Update 1) Linux version 2.6.9-11.EL, Intel® EM64T.

Linpack. Intel internal measurement (September 2005). Baseline Platform configuration: Intel® Server System "Coyote" with two 64-bit Intel® Xeon® processors 3.60 GHz with 2MB L2 Cache, Intel® E7520 Chipset, 800 MHz FSB; 8 GB DDR2-400 memory (8x1GB); OS: Red Hat Enterprise Linux® AS release 3 (Taroon Update 2) Linux version 2.4.21-12.EL, EM64T Intel LINPACK Workload Version: 2.1 for EM64T, Workload: 1Kx1K through 30Kx30K matrix sizes used; Workload Type: Scalar. New Platform configuration: Intel® Server System "Coyote 2" with two Dual-Core Intel® Xeon® processors 2.80 GHz, Intel® E7520 Chipset, 800 MHz FSB; 8 GB DDR2-400 memory (8x1GB); OS: Red Hat Enterprise Linux AS release 3 (Taroon Update 3) 2.4.21-20.EL x86_64 GNU/Linux, Intel® EM64T, Intel LINPACK Workload Version: 2.1.2 for Intel® EM64T, Workload: 1Kx1K through 30Kx30K matrix sizes used; Workload Type: Scalar.

Dual-Core Intel® Xeon® Processor 2.80 GHz Overview

DP servers based on the Dual-Core Intel Xeon processor 2.80 GHz help deliver performance, reliability, versatility, low ownership costs, and more.

Features	Benefits
Dual-Core Intel® Xeon® processor	Provides two execution cores in one physical processor, allowing the platform to do more in less time
2x2MB integrated L2 cache	Each processor core is equipped with its own 2MB cache, allowing the execution cores to quickly access data for processing and reducing the amount of system bus traffic
Intel® Extended Memory 64 Technology ³ (Intel® EM64T)	Enhances Intel® Architecture platforms with 64-bit computing and related instructions, allowing flexibility for 64-bit and 32-bit applications and operating systems
Demand-Based Switching ⁴ (DBS) with Enhanced Intel SpeedStep® technology	Helps reduce average system power consumption and potentially improves system acoustics
Streaming SIMD Extensions 3 (SSE3) instructions	Better multimedia and encryption/decryption processing, along with support for more computationally intensive graphics
Hyper-Threading Technology ²	Allows each core to function as two logical processors providing for better compute throughput when used with threaded applications; helps improve processor utilization and system responsiveness for better user experience compared to previous generation
800 MHz system bus	Provides excellent platform bandwidth in conjunction with DDR2-400 memory and PCI Express* I/O and graphics

Platform Solutions

Dual-Core Intel Xeon processors are based on the Intel E7520 chipset. This chipset delivers increased system bus, memory, and I/O bandwidth for enhanced performance, scalability, and end-user productivity compared to the previous generation. Its full-featured support includes three configurable PCI Express x8 links.

Platforms that support Dual-Core Intel Xeon processors are also compatible with prior-generation 64-bit Intel Xeon processors and Intel-enabled thermal solutions. The processor employs an mPGA604 socket and FC-mPGA4 package.

The Dual-Core Intel Xeon processor feature set includes:

- 2.80 GHz processor speed
- Dual-core processing
- 2x2MB L2 cache
- Hyper-Threading Technology
- 64-bit computing
- Demand-Based Switching
- Execute Disable Bit functionality
- 90 nm process technology



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¹ Performance gain based on result submitted to www.spec.org on SPECint*_rate_base2000 benchmark. **Baseline System Configuration:** IBM eServer* xSeries* 346 Server platform with Two 64-bit Intel® Xeon® processors 3.60 GHz with 2MB L2 Cache and 800 MHz system bus 8x512MB ECC PC2-3200 DIMMs for RAM and Windows* 2003 Standard Edition for OS. Intel Compiler 8.1 binaries. For more information see <http://www.spec.org/cpu2000/results/res2005q2/cpu2000-20050514-04113.html>. **New Platform Configuration:** IBM eServer* xSeries* 346 Server platform with Two Dual-Core Intel® Xeon® processors 2.80 GHz with 2x2MB L2 Cache 800 MHz system bus, 4 GB DDR2, Microsoft Windows Server* 2003, standard Edition, Intel C/C++ Compiler 9.0 (20050624Z) for 32-bit applications, Intel Fortran Compiler 9.0 (20050624Z) for 32-bit applications, Microsoft Visual Studio .NET* 13.0.9466 (for libraries) MicroQuill Smartheap Library* 7.30 Submitted to www.spec.org for review as of Oct 10, 2005. For additional information on other applications tested and benchmark results see <http://www.intel.com/performance/server/xeon/index.htm>. Results vary by hardware and software configuration.

² Hyper-Threading Technology requires a computer system with an Intel® Xeon® processor supporting Hyper-Threading Technology and an HT Technology-enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. See <http://www.intel.com/info/hyperthreading/> for more information including details on which processors support HT Technology.

³ Intel® EM64T requires a computer system with a processor, chipset, BIOS, OS, device drivers and applications enabled for Intel EM64T. Processor will not operate (including 32-bit operation) without an Intel EM64T-enabled BIOS. Performance will vary depending on your hardware and software configurations. Intel EM64T-enabled OS, BIOS, device drivers and applications may not be available. Check with your vendor for more information.

⁴ Actual power savings will vary based on system configurations and workloads.

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SPECint2000 and SPECfp2000 benchmark tests reflect the performance of the microprocessor, memory architecture and compiler of a computer system on compute-intensive, 32-bit applications. SPEC benchmark tests results for Intel microprocessors are determined using particular, well-configured systems. These results may or may not reflect the relative performance of Intel microprocessor in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks; to evaluate the performance of systems they are considering purchasing.

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